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ABSTRACT

While improved student achievement remains the ultimate goal for systemic reform activities, it may take several years for reforms to manifest themselves in measurable student performance outcomes. Included in this 8-panel brochure is a set of intermediate benchmarks that can be used to determine if states, school districts, and regions are making reasonable progress in their reform efforts. The document is divided into 10 parts, each starting with a goal for systemic reform, and a number of specific benchmarks of progress relative to that goal. (ZWH)

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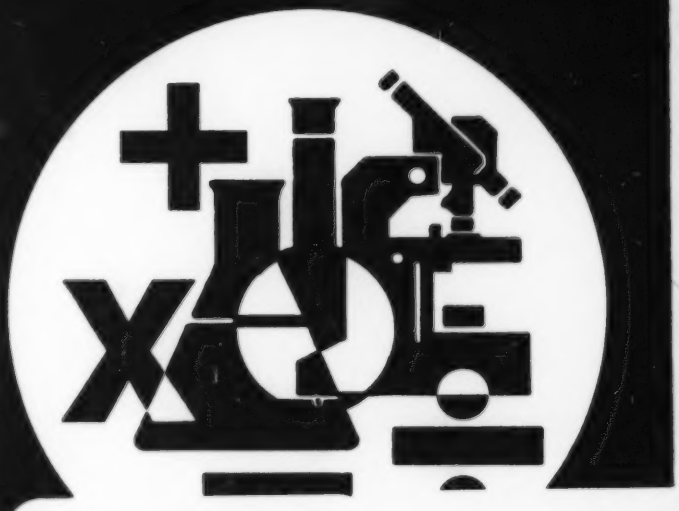
Intermediate Benchmarks for Systemic Reform in Mathematics and Science Education



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INTERMEDIATE BENCHMARKS FOR SYSTEMIC REFORM IN MATHEMATICS AND SCIENCE EDUCATION

While improved student achievement remains the ultimate goal for systemic reform activities, it may take several years for reforms to manifest themselves in measurable student performance outcomes. The following is a set of intermediate benchmarks that can be used to determine if states, school districts, and regions are making reasonable progress in their reform efforts. Even though systemic reform activities share a certain set of characteristics, the absence of some of these characteristics does not necessarily mean that a reform effort will fail, just as their presence does not guarantee success. Identification of potential problems through the use of these benchmarks will enable agencies and others to make adjustments at midpoints in the reform process, rather than waiting for as much as a decade to determine whether real change is occurring and education improving.

This document is divided into ten parts, each starting with a goal for systemic reform, and a number of specific benchmarks of progress relative to that goal.

The benchmarks are written for state, district, city or regional systemic reform efforts relative to the National Science Foundation's state, urban and rural systemic initiatives and the reform initiatives under Goals 2000.

1. *Appropriate legislation and incentives are needed in states and districts to ensure that quality curricular frameworks exist.*

    - Representatives of the state, local school systems, professional organizations and communities have been involved in the development of challenging standards through

participation, extensive comments on draft materials, submission of materials, and suggestions to organizations developing standards.

- Curriculum frameworks have been developed by the state in conjunction with local districts, or are nearing completion, in one or more of the core subjects. These frameworks call for challenging curricula based on the standards.
- The state has established a mechanism to review state frameworks in the core areas.
- Funds have been made available to implement challenging standards-based frameworks in the schools.
- The state has developed and begun implementing a strategy for informing districts and schools regarding priorities and curriculum frameworks implementation activities.

2. *Periodic state review of schools and districts is necessary for systemic reform of education, and this review needs to include curriculum review.*
   - The state has revised accreditation standards and review processes to reflect inclusion of challenging standards-based school curricula.
   - The state has provided guidance to districts and schools as they try to change their curricula in response to challenging standards.
   - The state has developed a strategy for providing continuous feedback to districts and schools related to the reviews.

3. *Both inservice and preservice professional development must be consistent with high quality content standards and the best pedagogical practices.*

- Teachers are involved in the development of curriculum frameworks and professional development strategies related to their implementation in core areas.
- Universities and colleges have changed their practices for teacher preparation so that they are aligned with new content and performance standards. Teacher certification (and recertification) has been modified to reflect the changes in curriculum content knowledge required, as well as the new pedagogical approaches.
- State education agencies and school districts have changed their professional development requirements and practices so that they are aligned with the quality curricula and content standards.
- States and districts encourage and support quality professional development activities identified and planned by school staff.
- Universities, colleges, and state agencies and school districts are building sustained professional development based on local professional development funds and special initiatives, including Statewide Systemic Initiatives, Eisenhower, NSF Teacher Enhancement, frameworks development, based on the standards.

- Incentives, such as licensing, pay increases, and mentorship opportunities, are available to teachers who have proved that they are teaching to higher content and pedagogical standards.

4. *State activities financed through our respective programs (NSF and ED) should contribute to a single, integrated reform effort.*

   - The state has developed a plan in collaboration with local districts that outlines how federal resources will support the state's reform efforts, with respect to implementing content and performance standards and assessments.
   - The state is using federal resources, including Title I, Eisenhower, NSF resources, ESEA Title VII Carl Perkins vocational funds, School to Work Opportunity funds, and Goals 2000, to promote reform tied to challenging content and performance standards or all students.
   - The state education agency has been reorganized to integrate programs, including all of those listed in the previous bullet, with state-level reform efforts.

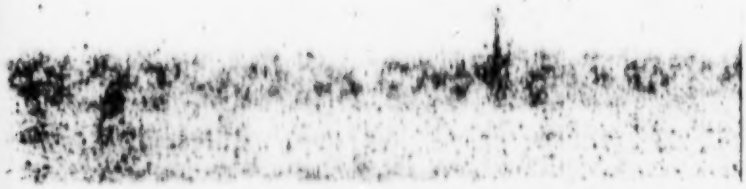
5. *State and local leadership support, both financial and philosophical, is necessary for systemic reform to be implemented.*

   - Other legislation affecting families and children supports attainment of high standards and the removal of barriers to this attainment.
   - The governor, chief state school officer, school administrators, school boards and other officials use their offices to promote systemic reform.

- The budget across state agencies supports systemic reform.
- State and local initiatives (in addition to funding) reinforce content or elements in the systemic reform plan. For example, if the state requires a report card, are the required elements descriptive of areas in the systemic reform plan?
- The state has established a communications outreach strategy to encourage school staff to implement reform.

6. *Curriculum and assessment should serve the same purpose of improved student achievement.*
   - Classroom assessment strategies are consistent with instructional strategies.
   - Curricular materials and technologies show evidence of alignment with the state standards.
   - State assessment systems have been changed to reflect the new curricular frameworks and standards. Major state assessments occur at grade levels with stated performance standards.
   - Preservice and inservice professional development includes both curriculum and assessment components consistent with state reforms.
   - More students are taking challenging mathematics and science courses for longer periods of time.

7. *All students are served by new standards and reform activities.*
   - The state, local school districts, and schools have baseline data on student achievement collected at regular intervals, broken out by race, ethnicity,

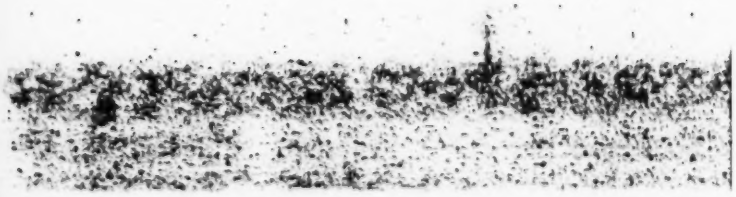


gender, limited English proficiency, students with disabilities, and percentage poverty level in the school. This information is routinely and publicly reported.

- The state and local school districts have a strategy for addressing issues of underrepresentation. For example, there are policies to ensure that curriculum and assessment materials are free of bias and apply to all children, and tracking is discouraged.
- There are ways to assess access to materials and supplies to ensure fairness. Students are ensured equitable access to qualified, certified teachers.
- The state is implementing a means for ensuring that all students have an equal opportunity to learn. This includes reviewing school finance formulas.

8. *Implementation of systemic reform activities requires the best work of all parties and substantial technical assistance.*

   - The state has clearly identified all of the components that it is addressing in systemic reform. There is a strategic plan with goals, objectives, activities, timelines, and responsibilities assigned.
   - Local school districts have participated in the development of the state plan and have designed their own comprehensive plans.
   - Strategic plans developed by the state, districts, and schools are reviewed regularly, and revisions are made as necessary.
   - Staff are assigned who are qualified to implement the plan for systemic reform.



- The state has provided technical assistance to districts and schools to help them implement systemic reform.

9. *States, districts, and local schools, in partnership with the communities they serve, must develop the capacity to undertake and sustain reform.*

   - The state leadership, governor, representatives, and policymakers have joined forces with their local counterparts for systemic reform of education in the state.
   - Colleges and universities in the state, both public and private, have joined the systemic reform activities. The discipline-based professors and the education professors are working together.
   - Parents and parent organizations, civil rights advocacy groups, church groups, and the community-based organizations, boys and girls clubs, scouts, 4-H groups, museums and others have been integrally involved in all facets of the reform activity.
   - Local industries and businesses in the state have been involved in the reform activities.

10. *The ultimate goal for any systemic reform activity is improved student performance in the core areas, including in particular mathematics and science, at all grade levels.*

    - There are clearly articulated goals for student performance at the 5-year, 10-year, and 20-year mark, and there is a system in place to track program and student progress from Kindergarten through 12th grade, sufficient current data for use in comparative analysis,

and the ability to break out data by gender, ethnicity, and other parameters. (NAEP assessments alone are inadequate for measuring mastering of the new ambitious content requirements.)

- State, local district, and school evaluation plans include a methodology for evaluating progress in all aspects of reform, including teacher competencies, student progress, partnership development, and utilization of all components of funding towards commonly established goals.
- Evaluation plans for state, local, and school-based reform activities provide regular feedback on all areas of program management, including student progress, to allow for midcourse corrections as needed.
- There exist special systems to review progress of special student populations such as LEP students and students with disabilities who might require adjusted assessments.

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